

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Application of: Group Art Unit: 1755
Applicant: Ramesh Subramanian Examiner: Marcantoni, Paul D.
Serial No.: 10/010,676 Atty. Dkt.: 2001P23114US
Filed: 12/06/2001
Title: HIGHLY DEFECTIVE OXIDE AS SINTER RESISTANT THERMAL
BARRIER COATING

Commissioner for Patents
P.O. Box 1450
Washington, DC 20231-450

DECLARATION OF RAMESH SUBRAMANIAN
UNDER 37 CFR 1.132

1. I, Ramesh Subramanian, a citizen of India, hereby declare and state as follows:
2. I have been continuously employed by Siemens Westinghouse Power Corporation and its predecessor, Westinghouse Electric Corporation, for approximately the past eight years. I am currently Coating Group Leader in the Materials Department, and I work in the field of high temperature ceramic materials.
3. Prior to my employment by Westinghouse Electric Corporation, I was employed by the Department of Energy at the Oak Ridge National Laboratory for approximately two and one-half years, working in the field of high temperature materials.
4. I received a doctorate degree (PhD) in Materials Science from Cornell University in 1995. My combined academic and commercial experience in the field of materials science totals approximately sixteen years.
5. In the 12/16/2004 Response under 37 CFR 1.111 for the above-cited application, the applicant reserved the right to provide additional evidence that the extra components of the composition of Worrell patent 4,931,214 would

materially change the characteristics of the applicant's claimed composition. Such evidence is attached hereto in the form of Fig. 6521 on page 191 of "Phase Diagrams for Ceramists Volume VI" which shows that the melting temperature of ZrO_2 is about $2,700^\circ\text{C}$ TiO_2 while the melting temperature of TiO_2 is only about $1,850^\circ\text{C}$. Thus, the addition of the third oxide of titanium dioxide that is taught by Worrell would significantly lower the melting temperature of the applicant's claimed composition, thereby materially changing its characteristics as a thermal barrier coating material.

6. Also attached is Fig. 375 of page 144 of "Phase Diagrams for Ceramists Volume I" which shows that the melting temperature of $\text{NbO}_{2.5}$ is $1,491^\circ\text{C}$ and the melting temperature of $\text{TaO}_{2.5}$ is $1,872^\circ\text{C}$. These melting temperatures are significantly lower than the melting temperature of ZrO_2 , thus the addition of these compounds as taught by Maze patent 4,507,394 would significantly lower the melting temperature of the applicant's claimed composition, thereby materially changing its characteristics as a thermal barrier coating material.

7. With regard to patent 5,789,330 to Kondo, it is noted that the presently claimed compositions are cubic matrix structures, whereas Kondo specifically drives his composition to include the monoclinic phase in order to improve its utility as an ingot material. Although Kondo allows for as much as 40 wt% stabilizer, such high stabilizer materials do not include yttria stabilized zirconia. The attached Fig. 5251 on page 141 of "Phase Diagrams for Ceramists Volume IV" shows that the monoclinic phase of a zirconia-yttria system can exist only below about 10 wt% yttria. This is consistent with all of the specific examples described by Kondo, which all contain significantly less than the presently claimed 30 wt% stabilizer. Thus, the general statement in Kondo regarding possible high levels of stabilizer does not support the rejection of the present claims, and in fact Kondo actually teaches away from the YSZ materials of the present claims because Kondo requires high monoclinic phase content.

8. Column 10, lines 20-29, of Maloney patent 6,177,200 indicates a relationship between atomic mass and thermal conductivity of ceramic

compounds. It is my professional opinion that the addition of a third and different oxide in more than a trace amount to any two-oxide ceramic composition would materially change the important characteristics of such composition.

9. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or of any patent issuing there from.

Dated: March 9th 2005

By: 

Ramesh Subramanian